



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Jennifer Stone-Sundberg, et al.

Title: SPINEL BOULES, WAFERS, AND METHODS FOR FABRICATING SAME

Application No.: 10/668,610

Filed: September 23, 2003

Examiner: Stephen J. Stein

Group Art Unit: 1775

Atty. Docket No.: 1075-BI4281

MS AMENDMENT
COMMISSIONER FOR PATENTS
PO Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL

Dear Sir:

Pursuant to 37 C.F.R. § 1.56, § 1.97 and § 1.98, the undersigned brings the patents, publications, applications or other information identified in the attached:

- ☒ Form(s) PTO/SB/08A and/or PTO/SB/08B or PTO/1449
☐ Other: n/a

to the Examiner's attention in the above-identified application. Citation of such information shall not be construed as:

1. an admission that the information necessarily is, or corresponds to, prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described below; or
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

For each item of information listed that is not in the English language, the undersigned has provided a concise explanation of the relevance, such as through (i) an English language abstract, (ii) an English language equivalent application, (iii) reference to discussion in the application, or (iv) if cited in a search report or other action by a foreign patent office in a counterpart foreign application, an English language version of the search report or action that

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as either First Class Mail or Express Mail, in an envelope addressed to the Commissioner for Patents on 11-3-05.

Elise K. Dougherty
Typed or Printed Name

E.K. Dougherty
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indicates the degree of relevance found by the foreign office.

STATEMENT UNDER 37 C.F.R. § 1.704(d)

If the above-identified application is an original application filed on or after May 29, 2000:

- ☐ each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

FEES DUE

This Information Disclosure Statement is being filed:


- ☐ within three months of the filing date of a national application or within three months of entry of the national stage as set forth in § 1.491 in an international application. Therefore, no fee is required.
- ☒ before the mailing date of a first Office action on the merits or before the mailing date of a first Office action after the filing of a request for continued examination under § 1.114. Therefore, no fee is believed required.
- ☐ during the period specified in § 1.97(c). Each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application not more than three months prior to the filing of this Information Disclosure Statement.
- ☐ during the period specified in § 1.97(c). Accordingly, the fee set forth in § 1.17(p) is required and provided as shown on the attached Fee Transmittal.
- ☐ during the period specified in § 1.97(d). Accordingly, the fee set forth in § 1.17(p) is required and provided as shown on the attached Fee Transmittal. Additionally, each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application not more than three months prior to the filing of this Information Disclosure Statement.

Should any PTO fees be necessary for entry of this Information Disclosure Statement, the undersigned hereby authorizes the Commissioner to charge Deposit Account 50-2469.

Date

11/2/05

Respectfully submitted,



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Attorney for Applicant(s)

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LIST OF RELATED APPLICATIONS

<u>Application No.</u>	<u>Filing Date</u>	<u>Applicant(s)</u>	<u>Docket No.</u>
11/065,397	02/24/05	Tanikella, et al.	1075-BI4345

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Sheet 1 of 13

Complete if Known

Application Number	10/668,610
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First Named Inventor	Jennifer Stone-Sundberg
Art Unit	1775
Examiner Name	Stephen J. Stein
Attorney Docket Number	1075-BI4281

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
	A1	US- 3,753,775	08/21/1973	Robinson et al.	
	B1	US- 3,964,942	06/22/1976	Berkenblit et al.	
	C1	US- 4,649,070	03/10/1987	Kondo et al.	
	D1	US- 4,657,754	04/14/1987	Bauer et al.	
	E1	US- 5,643,044	07/01/1997	Lund	
	F1	US- 5,742,026	04/21/1998	Dickinson, Jr. et al.	
	G1	US- 5,989,301	11/23/1999	Laconto, Sr. et al.	
	H1	US- 6,048,577	04/11/2000	Garg	
	I1	US- 6,238,450 B1	05/29/2001	Garg et al.	
	J1	US- 6,258,137 B1	07/10/2001	Garg et al.	
	K1	US- 6,265,089 B1	07/24/2001	Fatemi et al.	
	L1	US- 6,364,920 B1	04/02/2002	Garg et al.	
	M1	US- 6,391,072 B1	05/21/2002	Garg	
	N1	US- 6,406,769 B1	06/18/2002	Delabre	
	O1	US- 6,418,921 B1	07/16/2002	Schmid et al.	
	P1	US- 2001/0026950 A1	10/04/2001	Sunakawa et al.	
	Q1	US- 2002/0028314 A1	03/07/2002	Tischler et al.	
	R1	US- 2002/0030194 A1	03/14/2002	Camras et al.	
	S1	US- 2003/0190770 A1	10/09/2003	Yeom et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T ⁶
		Country Code ³ Number ⁴ Kind Code ⁵ (if known)				
	T1	CN 1291795	04/18/2001	Guanglei Sci & Tech Co. Ltd.	English Abstract Only	
	U1	CN 1379484	11/13/2002	Univ Qinghua	English Abstract Only	
	V1	CN 1469459	01/21/2004	Fudi Elect. Mat. Co. Ltd.	English Abstract Only	
	W1	CN 1476046	02/18/2004	Shanghai Prec. Opt. Instr	English Abstract Only	
	X1	CN 1476047	02/18/2004	Shanghai Prec. Opt. Instr	English Abstract Only	
	Y1	EP 997445	05/03/2000	Corning Inc.	English Abstract Only	

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Sheet 2

of 13

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Attorney Docket Number	1075-BI4281

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		Number-Kind Code ² (if known)			
	A2	US- 2003/0213950 A1	11/20/2003	Hwang	
	B2	US- 2004/0063236 A1	04/01/2004	Kwak et al.	
	C2	US- 2004/0089220 A1	05/13/2004	Kokta et al.	
	D2	US-			
	E2	US-			
	F2	US-			
	G2	US-			
	H2	US-			
	I2	US-			
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		Country Code ³ Number ⁴ Kind Code ⁵ (if known)				
	T2	EP 1298709	04/02/2003	NGK Insulators Ltd.	English Abstract Only	
	U2	EP 1394867	03/03/2004	Samsung Elect. Co. Ltd.	English Abstract Only	
	V2	JP 53-043481	04/19/1978	Matsushita Elec Ind. Co. Ltd.	English Abstract Only	
	W2	JP 79-026873	09/06/1979	Nippon Elect. Co.	English Abstract Only	
	X2	JP 58-090736	05/30/1983	Tokyo Shibaura Elect. Co	English Abstract Only	
	Y2	JP 61-142759	06/30/1986	NGK Spark Plug Co. Ltd.	English Abstract Only	

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	A3	US-			
	B3	US-			
	C3	US-			
	D3	US-			
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		Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)				
	T3	JP 62-123059	06/04/1987	Narumi Seito KK	English Abstract Only	
	U3	JP 7-235692	09/05/1995	Sony Corp.	English Abstract Only	
	V3	JP 8-040797	02/13/1996	Kyocera Corp.	English Abstract Only	
	W3	JP 8-083802	03/26/1996	Shingijutsu Kigyodan	English Abstract Only	
	X3	JP 8-095233	04/12/1996	Tono Seiki YG	English Abstract Only	
	Y3	JP 9-129651	05/16/1997	Hewlett-Packard Co.	English Abstract Only	

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		Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)				
	T4	JP 9-129928	05/16/1997	Toshiba KK	English Abstract Only	
	U4	JP 11-195813	07/21/1999	Toshiba Denshi Eng. KK	English Abstract Only	
	V4	JP 11-235659	08/31/1999	Ricoh KK	English Abstract Only	
	W4	JP 11-274559	10/08/1999	Sanyo Elect. Co. Ltd.	English Abstract Only	
	X4	JP 2000-228367	08/15/2000	Samsung Elect. Co. Ltd.	English Abstract Only	
	Y4	JP 2000-331940	11/30/2000	Sony Corp.	English Abstract Only	

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	T5	JP 2001-010898	01/16/2001	NEC Corp.	English Abstract Only	
	U5	JP 2001-198808	07/24/2001	Morioka Seiko Kogyo KK	English Abstract Only	
	V5	JP 2001-220295	08/14/2001	Namiki Seimitsu Hoseki KK	English Abstract Only	
	W5	JP 2001-253800	09/18/2001	Namiki Seimitsu Hoseki KK	English Abstract Only	
	X5	JP 2002-012856	01/15/2002	Neos KK	English Abstract Only	
	Y5	JP 2002-050577	02/15/2002	Namiki Seimitsu Hoseki KK	English Abstract Only	

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	A6	US-			
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	N6	US-			
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	P6	US-			
	Q6	US-			
	R6	US-			
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	T6	JP 2002-158377	05/31/2002	Matsushita Denki Sangyo KK	English Abstract Only	
	U6	JP 2002-255694	09/11/2002	Kyocera Corp.	English Abstract Only	
	V6	JP 2002-353425	12/06/2002	Kyocera Corp.	English Abstract Only	
	W6	JP 2003-045829	02/14/2003	Hitachi Chem Co. Ltd.	English Abstract Only	
	X6	JP 2003-113000	04/18/2003	Hitachi Cable Ltd.	English Abstract Only	
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Application Number	10/668,610
Filing Date	09/23/2003
First Named Inventor	Jennifer Stone-Sundberg
Art Unit	1775
Examiner Name	Stephen J. Stein
Attorney Docket Number	1075-BI4281

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
	A7	US-			
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	C7	US-			
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	F7	US-			
	G7	US-			
	H7	US-			
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FOREIGN PATENT DOCUMENTS

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		Country Code ³ Number ⁴ Kind Code ⁵ (if known)				
	T7	JP 2003-165042	06/10/2003	Okamoto Kosaku Kikai Seisakusho KK	English Abstract Only	
	U7	JP 2003-273022	09/26/2003	Namiki Seimitsu Hoseki KK	English Abstract Only	
	V7	JP 2003-320521	11/11/2003	Tokyo Tungsten KK	English Abstract Only	
	W7	JP 2003-334754	11/25/2003	Nippon Microcoating KK	English Abstract Only	
	X7	JP 2003-338638	11/28/2003	Nichia Kagaku Kogyo KK	English Abstract Only	
	Y7	JP 2004-006867	01/08/2004	Matsushita Denki Sagyo KK	English Abstract Only	

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	J8	US-			
	K8	US-			
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	T8	JP 2004-014691	01/15/2004	Mitsubishi Gas Chem Co Inc.	English Abstract Only	
	U8	JP 2004-140394	05/13/2004	Nissan Chem Ind. Ltd.	English Abstract Only	
	V8	KR 2002-043128	06/08/2002	Ulsan College	English Abstract Only	
	W8	SU 1781271	12/15/1992	Krasy Poly (Kypo)	English Abstract Only	
	X8	TW 550836	09/01/2003	Ind. Tech. Res. Inst.	English Abstract Only	
	Y8	WO 2000/68332	11/16/2000	MPM Ltd.	English Abstract Only	

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	M9	US-			
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	P9	US-			
	Q9	US-			
	R9	US-			
	S9	US-			

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	T9	WO 2002/92674	11/21/2002	US Sec of Navy	English Abstract Only	
	U9	WO 2004/33769	04/22/2004	Unisearch Ltd.	English Abstract Only	
	V9				English Abstract Only	
	W9				English Abstract Only	
	X9				English Abstract Only	
	Y9				English Abstract Only	

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Filing Date	09/23/2003
First Named Inventor	Jennifer Stone-Sundberg
Art Unit	1775
Examiner Name	Stephen J. Stein
Attorney Docket Number	1075-BI4281

Sheet	10	of	13
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NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	A10	Aeschlimann, R. et al., "The Chemical Polishing of Magnesium Aluminate Spinel in Pyrophosphoric Acid", MAT. RES. BULL., Vol. 5, pgs 167-172, 1970.	
	B10	Dwikusuma, F., "Study on Sapphire Surface Preparation for III-Nitride Heteroepitaxial Growth by Chemical Treatments", JOURNAL FOR ELECTROCHEMICAL SOC., Nov. 2002, 30 pgs.	
	C10	Kim, S. et al., "Stress Relaxation in Thick-Film GaN Grown by Hydride Vapor Phase Epitaxy on Sapphire and Spinel Substrates as Studied by Photoluminescence and Raman Spectroscopy", J. OF THE KR PHYS SOC., Vol. 34, No. 2, Feb. 1999, pgs 163-167.	
	D10	Kurobe, Toshiji, et al., "Magnetic Field-Assisted Lapping", BULL. JAPAN SOC. OF PREC. ENGG., Vol. 20, No. 1, March 1986, pgs 49-51.	
	E10	Libowitzky, E., "Optical Anisotropy in the Spinel Group: a Polishing Effect", EUR. J. MINERAL., Vol. 6, 1994, pgs. 187-194.	
	F10	Reisman, A., et al., "The Chemical Polishing of Sapphire and MgAl Spinel", J. ELECTROCHEM. SOC.: SOLID STATE SCIENCE, Vol. 118, No. 10, October 1971, pgs 1653-1657.	
	G10	Richter, F., et al., "Herstellung und Aurichtung Von MgAl-Spinell-Substraten fur die Halbleiterepitaxie", KRISTALL UND TECHNIK, Vol. 10, No. 3, 1975, pgs 33-348.	
	H10	Robinson, P., et al., "The Chemical Polishing of Sapphire and Spinel", RCA REVIEW, Vol. 34, December 1973, pgs 616-629.	
	I10	Roy, D., et al., "Spinel, Where did it go?", SPIE Vol. 3134, pgs 307-316.	
	J10	Wang, C., et al., "Growth and Characterization of Spinel Single Crystal for Substrate Use in Integrated Electronics", J. APPLIED PHYSICS, Vol. 40, No. 9, August 1969, pgs 3433-3444.	

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First Named Inventor	Jennifer Stone-Sundberg
Art Unit	1775
Examiner Name	Stephen J. Stein
Attorney Docket Number	1075-BI4281

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	A11	Yanina, S., et al., "Moving Steps and Crystal Defects on Spinel Surfaces", MAT. RES. SOC. SYMP., Vol. 620, 2000, pgs M9.4.1-M9.4.6.	
	B11	Byun, D., et al., "Reactive ion (N ₂ ⁺) Beam Pretreatment of Sapphire for GaN Growth", THIN SOLID FILMS, Vol. 326, 1998, pgs 151-153.	
	C11	Byun, D., et al., "New Pretreatment Method of Sapphire for GaN Deposition", PHYS. STAT. SOL., Vol. 176, 1999, pgs 643-648.	
	D11	Sung, Y., et al., "High Rate Etching of Sapphire Wafer Using Cl ₂ BCl ₃ Ar Inductively Coupled Plasmas", MAT. SCI. & ENG.: SOLID STATE MAT, Vol. B82, No. 1-3 2000, pgs 50-52. (ABSTRACT ONLY)	
	E11	Wang, X., et al., "Chemical Polishing of Sapphire for Growth of GaN", CHINESE JOURNAL OF SEMICONDUCTORS, Vol. 18, No. 11, pgs 867-871, 1997. (ABSTRACT ONLY)	
	F11	Lee, J., et al., "Scribing and Cutting a Blue LED Wafer Using a Q-Switched Nd:YAG Laser", APPLIED PHYSICS, Vol. 70, No. 5, pgs 561-564, 2000. (ABSTRACT ONLY)	
	G11	Kalinski, Z., "Preparation of Sapphire Substrates for Gas Phase GaN Epitaxial Processes", KRISTAL UND TECHNIK, Vol. 12, No. 10, pgs 1105-1110, 1977. (ABSTRACT ONLY)	
	H11	Jeong, C., et al., "Sapphire Etching with BCl ₃ /HBr/Ar Plasma", SURFACE & COATINGS TECHNOLOGY, Vol. 171, No. 1-3, 2003, pgs 280-284. (ABSTRACT ONLY)	
	I11	Kalinski, Z., et al., "Structural Etching of Al ₂ O ₃ Substrate Plates Applied in Gaseous Epitaxy of GaN Layers", ELEKTRONIKA, Vol. 18, No. 3, 1977, pgs 117-119. (ABSTRACT ONLY)	
	J11	Lakew, B., et al., "High Tc Superconducting Bolometer on Chemically Etched 7 Micrometer Thick Sapphire", NASA, 1997, 21 pgs. (ABSTRACT ONLY)	

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	A12	Jeong, C., et al., "Dry Etching of Sapphire Substrate for Device Separation in Chlorine-Based Inductively Coupled Plasmas", MAT. SCI. & ENG.: SOLID STATE MATERIALS, Vol. 93, No. 1-3, pgs 60-63, 2002. (ABSTRACT ONLY)	
	B12	Gu, E., et al., "Micromachining and Dicing of Sapphire, Gallium Nitride and Micro LED Devices with UV Copper Vapour Laser", THIN SOLID FILMS, Vol. 453-454, pgs 462-466, 2000. (ABSTRACT ONLY)	
	C12	Park, H., et al., "A Novel Process for the Generation of Pristine Sapphire Surfaces", THIN SOLID FILMS, Vol. 422, No. 1-2, pgs 135-140, 2000. (ABSTRACT ONLY)	
	D12	Fenner, D., et al., "Ion Beam Nanosmoothing of Sapphire and Silicon Carbide Surfaces", SPIE, Vol. 4468, pgs 17-24, 2001. (ABSTRACT ONLY)	
	E12	Blecha, Z., et al., "On Fabrication of Sapphire Substrates (1102) for Epitaxy of Monocrystalline Silicon", JEMNA MECHANIKA A OPTIKA, Vol., 28, No. 12, pgs 249-351, 1983. (ABSTRACT ONLY)	
	F12	Duffy, M., et al., "Optical Characterization of Silicon and Sapphire Surfaces as related to SOS Discrete Device Performance", JOURNAL OF CRYSTAL GROWTH, Vol. 58, No. 1, pgs 19-36, 1982. (ABSTRACT ONLY)	
	G12	Ehman, M., et al., "Mechanical Preparation of Sapphire Single-Crystal Surfaces by Vibratory Techniques", METALLOGRAPHY, Vol. 9, No. 4, pgs 333-339, 1976. (ABSTRACT ONLY)	
	H12	Druminiski, M., et al., "Deposition of Epitaxial Films on Spinel and Sapphire. Influence of Substrate Preparation", SIEMENS FORSCHUNGS - UND ENTWICKLUNGSBERICHTE, Vol. 5, No. 3, pgs 139-145, 1976. (ABSTRACT ONLY)	
	I12	Cullen, G., "The Preparation and Properties of Chemically Vapor Deposited Silicon on Sapphire and Spinel", JOURNAL OF CRYSTAL GROWTH, Vol. 9, pgs 107-125, 1971. (ABSTRACT ONLY)	
	J12	Liu, L., et al., "Substrates for Gallium Nitride Epitaxy", MAT. SCI. & ENG. REPORTS, Vol. R37, No. 3, pgs 61-127, 2000. (ABSTRACT ONLY)	

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	A13	Khattak, C., et al., "Production of Sapphire Blanks and Substrates for Blue LEDs and LDs", MAT. RES. SOC. SYMP. - PROCEEDINGS, V. 743, pgs 219-224, 2002. (ABSTRACT ONLY)	
	B13	Gutsche, H., et al., "Polishing of Sapphire with Colloidal Silica", JOURNAL OF THE ELECTROCHEMICAL SOCIETY, Vol. 125, No. 1, 1978, pgs 136-138, 1978. (ABSTRACT ONLY)	
	C13	Duffy, M., et al., "Semiconductor Measurement Technology: Method to Determine the Quality of Sapphire, (NOTE) Final Report", RCA Labs, 1980, 77 pgs. (ABSTRACT ONLY)	
	D13	Duffy, M., et al, "Method to Determine Quality of Sapphire, (NOTE) Interim Rept.", RCA Labs, 1975, 88 pgs. (ABSTRACT ONLY)	
	E13	Horie, S., et al., "Precision Grinding of Semiconductor - Related Materials", (JOURNAL) NEW DIAMOND, Vol. 20, No. 2, pgs 8-13, 2004. (ABSTRACT ONLY)	
	F13	Edgar, J., et al., "Substrates for Gallium Nitride Epitaxy", MAT. SCI. & ENG., PART R, Vol. R37, No. 3, pgs 61-127, 2002. (ABSTRACT ONLY)	
	G13	Author Unknown, "Specifications for Polished Monocrystalline Sapphire Substrates" 1996, Affiliation (Issuing Organization) SEMI Semiconductor Equipment & Materials International, USA. (Bibliographic Entry Only).	
	H13	Search Report for Technical Articles (Including various Abstracts of certain Identified References)	
	I13		
	J13		

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Applicant is to place a check mark here if English language Translation is attached.

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